

Geophysical Methods for Buried Waste Detection

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The customary approach of invasive drilling for evaluating the type and amount of waste buried in the subsurface is always costly and inefficient; in many cases it is ineffective and inconclusive, and in some cases even dangerous. It is essential to develop a non-invasive, cost-effective means of investigating the subsurface for locating and defining buried solid objects and liquids. Over the past few decades, a large suite of near-surface geophysical methods have been developed and refined. Geophysical methods can be a useful aid to hazardous waste investigations, since geophysical methods measure differences in the physical properties of the subsurface environment. Interpretations are based on measured response of the subsurface to artificial or natural stimuli. Passive investigations use naturally occurring fields such as the earth's gravity, magnetic, and electric fields. Active investigations use a source of energy such as seismic waves, radar pulses, or electrical inputs. There is great potential for these methods to define subsurface details with a level of accuracy, precision, economy, and safety that can approach direct sampling but with much greater coverage.

Since the mid-1980s, Region 5 has been applying geophysical methods to a number of removal, remedial, Brownfield and underground storage tank sites. This support has been provided to federal and state agencies, local municipalities, as well as various tribal governments. The most useful techniques for waste detection at these sites have proven to be magnetics, electromagnetics, and ground penetrating radar. Lately, geophysical surveys have been conducted by Region 5 at a number of Brownfield sites with good results. This support has given local municipalities valuable information about subsurface conditions without using up their valuable grant funds. Region 5 has worked with universities and other federal agencies to further develop these techniques for environmental applications. Recent projects have included the development of 3-dimensional imaging techniques for ground penetrating radar and a ground-based positioning system to interface with various geophysical instruments. Examples of geophysical surveys for waste detection conducted in Region 5 (with emphasis on those for state and local governments) will be highlighted in this presentation. In addition, advances in geophysical techniques supported by the Region, and how they have been applied to actual sites, will also be highlighted.

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